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Monthly meetings of S.B.A.C.E. are held on the 3rd Thursday of each month at 7:00 PM at:

> HW Computers
> 2301 Artesia Blvd.
> Redondo Beach,Calif. 90278

Our esteemed officers are:

President	Jerry Bransford
Vice President	Alan Haskell
Secretary/Treasurer	James Jengo
Librarian	Harry Koons
Newsletter Editor	Sue Whitehead

From the Editor's desk:

Well here it is my first attempt at putting together a newsletter.I hope it gets easier as I get more experience behind me. I want to thank everyone who has written articles for this issue. Also a lot of thanks goes to Bill Cagle, as those of you who attended our last meeting know Bill had sat down and made a bunch of designs for our newsletter. We voted on them and the one that was chosen is adorning our front page. For his efforts Bill was given a copy of De Re Atari. Thanks again Bill.

I hope more of our members will be contributing to our newsletter in the future. My file of up comming articles is a little (correction a lot) empty. At this moment I have only two articles for the next issue. Please help me!!! Remember even if you don't think you have a the expertise in a certain subject to write you do have your opinions about software or books. The rest of us would love to hear them. Maybe you have something to say like Jerry Bransford our President about Atari or any other company that you have had dealings with. Good or bad it would alert the rest of us and possibly help someone from getting ripped off. Let's hear from you.

Thanks again to everyone. See you at the next meeting.

Sue W.

The following was taken from a newspaper article:

HIGH COST OF SERVICE

We're all well aware of what it cost to get anything fixed nowadays. But in the case of micros, it sometimes seems that the service costs more than the micro is worth. Most service for a micro is $100 and up. With the falling prices of hardware and rising cost of service, it could be that the smaller micros are going to become disposable in the not-too-distant future.

CHOPPING THE HIGH COST OF PRINTER RIBBONS

With the falling prices of printers, they are becoming common on most micros,particularly dot-matrix units like Epson's MX-70 and MX-80. The hitch is if you do lots of printing, the cost of ribbons can add up to as much as the printer over a period of time. Current retail for MX-80 "harmonica" ribbon cartridges is about $15.

I recently tried out a method that gives you a re-inked ribbon for pennies-and takes about five minutes to do the job. It's a clever little machine from Ink-A-New (Box 229, Manhasset, NY 11030, (516) 627-1253), and the best part is the price-$35 in single quantity, including shipping. I re-inked one of my Epson ribbons with the device and found that not only did I get good-quality printing, but that it seemed to print at least twice as long as a brand-new ribbon. While you do have to be careful when loading up the ink well, the rest of the process is easy. Just turn the crank and the machine does the rest, including drying the special ink with a fan before it re-enters the cartridge. Don't look in the local computer store for the Ink-A-New machine, as the designer, Morton Warnow, only sells them by mail.

PREXY'S POSITS

"I'm mad as hell, and I'm not going to take it anymore." That is what the Anchorman, Howard Beale, shouted out the window. In the motion picture "Network" Howard stimulated a hugh backlash against the cross and cynical TV bosses. I can't hope to be as chrismatic as Howard Beale, but I do want to start a snowball rolling down hill and I hope to pick up a lot more than momentum with it. My Atari 800 and disk drive are just old enough to need all of the upgrades that the more recent (and much less expensive too) units already have.

Those of you who have built electronic kits in the past quarter-century are aware that you can build just about anything short of an electronic mousetrap. My two children built a 21 inch color television with some supervision form myself. They were 13 and 16 years old (the older was a girl). [Editor's observation: This particular statement sounds rather male chauvinistic if you ask me. So what if the elder child was a girl. "See what happens when the editor types your articles? "]

You can buy an electronic organ with a full footpedel board as you would find in a church or theater, and you can even buy the latest Heathkit (Zenith) computer in kit form and build it from scratch. Heathkit assumes that you have never soldered a connection and it teaches you the difference between a blade and a phillips screwdriver.

Since I have had my Epson mx-80 dot matrix printer for nearly two years, it needed a Graphtrax Plus upgrade, Hey,no problem; not to worry. The two ROM chips that replace the single one were installed and running in fifteen minutes (including a cup of coffee).

Unfortunately, Atari has decided that **WE** are all feeble minded. Pay no mind to the facts such as (1) our equipment is way past warranty, (2) many of us have modified our 8K RAM cards to 16K or 32K or even to 64K, and (3) many of us are electronics engineers, techinicians, drafters, or other electronics-related employee or long-time hobbyists, HAM operators, etc. Atari has seen fit to inslut our intelligence without even an explanation. I don't believe they even make any profit out of most retrofits since these are usually done by Atari approved independent technicians.

Now, it is understandable that Atari does not want us to put our grimy paws into the mechanism without some clear-cut guide. Note, however, that even three years or so later, the mechanical data available to us on the interior of any Atari product is practically nil. Atari simply will not consider making available data such as Howards Sams publishers or Heathkit has become a past master at creating. Atari has **NO** vaild reason, absolutely none, for witholding instruction to, for example, replace the CTIA with the GTIA chip.

I'm damn angry and I hope my anger will be contagious. I want the other clubs to pick up on this and write about their experiences with making modifications without any help from Big Daddy Atari from whom all blessing must flow. Put it into your newsletters, send then to Mark Cator or Earl Rice with a copy to the new president of Atari, Inc. Home Computer Division, John Cavalier. With a name like his, perhaps he will get on his horse and do something to undo the damage Atari's attitude has done in the past.

Jerry Bransford
President, SBACE

NEW MEMBERS

S.B.A.C.E. welcomes the following new members:

Ceferino Felarca	Robert Hutchison
Dean Garth	Darth Vader
Mark Cutsforth	William Little
Donald Leach	Kingsley Kau
Bart Buehler	Robert McDonald
Paul Iden, Jr.	Richard Romani
John Gutt	Bruce Taylor
Don Foley	Salvador Carrillo
Brian Cyr	

OUTER SBACE (What's Gnu)

by James Jengo

Well, it seems that Atari has come out with a new computer, the 1200XL, which will come (? March) with 64K memory, 4 programmable special function keys and built-in diagnostics. It is fully compatable with software and hardware for the 400/800 but will have only one cartridge slot, on the side (it will accept the 400/800 cartridges). A European character set is even built in! A new program recorder, an 80-column printer and a 40-column printer/plotter were also announced.

New software for early (?) 1983 release includes: E T Phone Home; Dig Dug; Qix; Juggle's Rainbow (& House); Family Finances; Timewise (a time management/calendar program); Atari Writer (a word processor cartridge); and Atari Music I (music tutor).

Atari has also supplied us with the AMIS Bulletin Board System developed by the Michigan Atari Computer Enthusiasts (including documentation).

A Users' Group logo has been designed by Atari and we will be supplied with appropriate stationery in the near future.

Two new Video Visits video tapes are near completion by Atari and we will request them (we are on the list for Video Visits I).

Atari will act as a focal point to circulate class material to other Users' Groups if anyone would like to submit the material to Atari.

Besides communicating with Atari with our Group's new modem (thank you HW (Jon and Robert) for your help and consideration), I have also downloaded some instructions for getting around in CIS and SIG*ATARI in Compuserve. Also, I have downloaded instructions for communication with an ARMUDIC Central Communicator. I have placed copies of both in the library as well as a list of other Atari BBS's.

NEWS FROM OTHER GROUPS

Be sure to keep checking our Big Red Book in the library for copies of Newsletters which we are fortunate to receive from other groups.

An interesting article from the Jersey Atari Computer Group suggested that since the cost of games is so high, that the club might start a library of commercial games. To join, one must contribute one original (legal, not duplicated) game and then may borrow another game disk/tape for a period of one month, and so on. Wonder if this would cut into the author's profits? They do it with books though. Think about this and lets discuss it at the next meeting.

From the Computer Club of OKC Inc.: if you get a data error while running a program reading in multiple data statements, PEEK(183)+256*PEEK(184) will give the line number the program stopped on; PEEK(185) will give the offset from the beginning of the line where the program stopped. PEEK(136)+256*PEEK(137) gives the memory where the first line of the program is stored. POKE 766,1 will keep listed control codes from executing.

HAPPY NEW YEAR !!!

THE GAME COLUMN

by Shawn Rohan
and Michael O'Shaughnessy

CHOPLIFTER

Last month we reviewed a game from Infocom called Zork I. As we stated, that was one of our favorite software companies. This month, we are going to review a game by Broderbund, who also makes excellent games. The game is called Choplifter.

Choplifter is an arcade style game that requires an Atari 800 or 400 with 48k and a joystick. The game is in machine language.

If you have ever wanted to be a pilot of any sort, you should like this game. You start out on a helicopter pad in front of a post office. At your disposal are three choppers which you fly around trying to save 64 hostages. The hostages are contained in bunkers. The first bunker has already been opened for you. Then you have to find out some way to open the other three bunkers. After you have opened one of the remaining three bunkers, more people will run out into the open waving their hands, motioning you to land. After you have landed, they start running for the chopper. If they dont get killed by one of the tanks, planes, or UFO's they climb into the helicopter.

As you get more experienced in the game, you get increasingly better at flying the helicopter; picking up men and so forth. Your chopper can hold only 16 men at a time, so after you pick up 16 men, you have to go back to the post office and land on the pad. The hostages get out of the chopper and run into the post office for safety. Everytime you land and let the people out of your chopper, the game gets a little more difficult.

We highly recommend this game to anyone who loves fast action, flying helicopters, along with good graphics and sound. On our game scale, Mike and I (Shawn) rated this game as a high 7.

." FORTH & BACK "

By D.J. Whitehead

Well here we are again, time for another FORTH article. As those of you who attended the last user's meeting will recall, I promised a set of screens to allow a 32K ATARI, with one disk drive to copy a Forth disk. So as promised, this months column has the desired screens. In order to allow easy modification of your old screen 36 , the new screens are based on the screens used in the SBACE FORTH.

The complete screens are as follows..

```
screen # 36
  0 ( DISK COPY ROUTINE -SBACE1.0)
  1 ( 32 K RAM AND ONE DRIVE )
  2 ( NOV 82 ... DJWJ )
  3 23500 CONSTANT BUFHEAD
  4 0 VARIABLE BLK#  0 VARIABLE ADRS
  5 : GET   ADRS @ BLK# @ ;
  6 : RD   GET DUP 718 = IF LEAVE THEN 1 R/W ;
  7 : WRT   GET DUP 718 = IF LEAVE THEN  0 R/W ;
  8 : +BLK  1 BLK# +! 128 ADRS +! ;
  9 : SETUP   BLK# ! BUFHEAD ADRS ! ;
 10 : KEYYET? ." HIT ANY KEY " KEY CR DROP SETUP ;
 11 : RDIN CR ." insert source disk"
 12 KEYYET? 40 0 DO RD +BLK LOOP ;
 13 : WRTO CR ." INSERT DESTINATION DISK"
 14 KEYYET? 40 0 DO WRT +BLK LOOP ;
 15 -->
```

```
SCR # 37
  0 ( DISK COPY ROUTINE SBACE1.0)
  1
  2 ( INSERT SOURCE DISK IN DRIVE #1)
  3
  4 ( SIMPLY TYPE "DISKCOPY" !)
  5 ( NOTE DESTINATION DISK MUST BE )
  6 ( FORMATTED PRIOR TO USAGE )
  7 : %COPY    0 DO I 40 *
  8          DUP DUP RDIN WRTO
  9          40 + . CR LOOP ;
 10 ( NOW FOR ACTUAL COMMAND)
 11 : DISKCOPY CR 18 %COPY ;
 12
 13
 14 ;S
 15
```

To use this copy routine, edit your old screens 36 and 37 to be like the above printout. Watch out for spaces, as my printer is writing condensed text, thus spaces may appear to be missing (but they are there!!). Then type in

    36 LOAD [return]
Have a formatted disk handy, along with the disk you wish to copy. Then type in

    DISKCOPY [return]
and follow the directions appearing on the screen. Note in the version above, you will have to swap between the source disk and the destination disk about 18 times !!! So much for the utility of

32K machines and one drive. However if you have a 48K ATARI with one drive, (or a 32K machine with 2 drives ??) by comparing the old screens with the screens as they appear above, the general copying process can be greatly improved for your specific mix of hardware. In fact, why not drop me a line (place it in the newsletter "in" box at H.W. Computers) covering your solution to the problem of copying Forth disks. I will place them in the column as they come in. (Really this is a plug to get YOU to send some Forth related software or news into this column.

For those of you who do not like to type, that includes me, I am placing in the SBACE LIBRARY two disks. One will be Forth software which I have checked out, while the other disk will be unprotected, and is for Forth programs from the SBACE MEMBERS. Please note , all contributions will be accepted, however, if possible, please have it run under the SBACE version of Forth. This will allow all our members to use it. In fact, why not write up a few words as to what your program does, and I will place it in this column. (GEE.. you add to the world of FORTH, and get YOUR NAME IN PRINT !!!)

For directions on how to use the Forth library disk read on.

General layout of Forth disk.

Screens 14, and 15 are RESERVED for the error messages. This allows the members with single drive systems the ability to use SBACE Forth. As any error during the running of the Forth program will list out a line from screen 14,or 15, some really strange messages will result should these screens not be reserved for this purpose.

Line 0 of each screen is RESERVED for a description of what the software is. This is to allow the INDEX word to list the contents of the disk. This is equivalent to being in DOS and typing A followed by two returns. (To use INDEX to check a disk , type

    0 88 INDEX [return].
The screen number, followed by line 0 from the indicated screen will appear.)

Screens below number 14, maybe used. However, be aware the Forth operating system normally occupies this space on the boot disk. Thus if any one tried to reboot from disk, life could get interesting for them. To avoid this , some people will wish to keep a copy of the operating system on ALL their disks. (Personal note, while maintaining multiple copies of the forth system will protect you, be warned that you are using about 16 percent of your disk space to do it. Therefore , after having 3 or 4 copies of the operating system around, you may desire to use the disk space for other software!!)

In order to copy the screens of interest , you must have a forth disk of your own to copy to. As any formatted disk will do, just remember, once you have placed a FORTH program on it , you can only use the disk with a FORTH operating system . So, assuming you wished to copy screens 14 , and 15 to your disk , the following procedure will work :

Go into the editor mode by typing 'editor cr' (remember, cr means return key).
                    Insert the source disk in drive 1.

List up to two of the screens you wish to copy , 'mark' ing each screen separately
(for our example -> 14 list mark 15 list mark cr.)

Now replace the source disk with the destination disk , and type 'flush cr '

At this point disk drive number one will come on, and dump your marked screens to the disk. If you have only one screen to dump , then just type the screen number followed by list and mark. Switch disks so your disk is in drive one and type flush !! However, if you have more then 2 screens to copy, you will have to do it 2 screens at a time, as the version of forth we are using only has room to buffer 2 screens of information at one time.

Now some news from the FORTH world. else where in this issue, is an article on fig-FORTH

1.5s for the Atari. This info is from Dave Flory , and appears to be a good deal. (At least it is good enough for me to part with my $$ to get a copy. I'll review it in another issue of the news letter).

                    Well thats about it for now, so lets hear from you out there... happy FORTHING

This is a file taken off of Jonith Johnsons BBS. It maybe of some interest to those of you who are interested in the FORTH language.

Sue W.

                              fig-FORTH 1.5S

     For any of you who are interested in fig-FORTH 1.5S for the Atari, it has recently been updated, with most of the changes being made in the editor. This has now been polished up a little with a border around it that lets you know exactly how much space is available for editing in the half screen on which you are working. The border color changes with the number base to prompt you as to which base you are using at present. You also have switchable sound prompts that let you know which half of a screen you are looking at and screen number is displayed at the bottom of the TV screen while you are editing. There are also commands to let you jump from the bottom of the previous, or the next screen, instead of having to go thru' the upper half to get there. The stack display can also be toggled on and off, and a documentation disk is available with approximately 28 screens of explanation of the special features of this package, for those who are new to FORTH.

     In order to expedite the filling of requests for this FORTH I am changing the procedure a little. In the past I have told people to send me two disks and I have copied it onto your disks and then mailed them back. This has proven unsatisfactory, to me at least, as several cases of mail damaged disks have occurred, and I have ended up using my own disks, so that people would not be disappointed in their desire to get this package. I think it will be simpler for everyone involved and no more expensive for the people who want the FORTH to handle it as follows. If you want just the source disk, with the small kernel, but all of the source screens, send a check for $5.00, and I will sent you the source disk. If you want both disks, the source disk and the one with the large compiled kernel and documentation on the special features of this FORTH version, send $7.00. Make all checks payable to Team Forth, and sent them to 4029 Payne Ave., San Jose, Ca., 95117. As close as I can estimate this I should end up getting about $.50 per package for the wear and tear on my disk drives and the trips to the post office and time involved in packaging and labeling, etc.
     I also encourage people in the San Jose area to visit one of the following stores, at a time convenient to the store, and make copies there. Software City at 106 El Paseo de Saratoga; Campbell Databank on West Campbell Ave. in Downtown Campbell; RAC Computers at Capitol Xpswy and King in San Jose; Electronic Fantasy in Vallco center in Cupertino on Wolfe Rd.; Pacific Stereo on Stevens Creek Blvd. in Santa Clara, and Computer Capers, Old Mill Shopping Center, San Antonio and Central Xpswy in Mt. View. If there are any Atari support dealers out there who would like to make this system available to their customers, please contact me and I will arrange to get it to you. This is a dynamite version of FORTH for the Atari, at least the equal of anything selling for up to $50, and its as close to free as I can Make it. Happy bytes, and keep on SWAPin'
Dave Flory

The LJK LETTER PERFECT Cartridge
by Dick Reaser (645-7063)

I was eventually led to this wordprocessing software by a simple imperative from my wife --- "We are not going to have any of that funny computer printing (dot matrix), RIGHT." RIGHT !!! So the research began. How to marry the ATARI 800 with word processor software and a letter quality printer at a "reasonable cost".

The most expensive thing seemed to be the printer ($2,000 to $3,000 in the spring of 82). I finally ran across an ad from C.ITOH located in Culver City. Their printer was about $1600 and only sold through Leading Edge. They did have some discontinued Starwriter demo models (FP-1500-25P) that they would sell direct for $800 with a new machine warrantee --- Great! But, would it work with the wordprocessors? I spoke with Atari people and with Text Wizard people. The answer was the same. There was no guarantee that they would work with this printer. They were not interested in modifying their programs nor helping me to do it. I was especially interested that functions such as right hand justification, superscript, subscript, **Boldface**, and underline be operational. The Letter Perfect disk versions had the same problems but they were about to come out with a cartridge that would be compatible with any printer.

I decided to gamble, but I had a tough time finding any store that knew any thing about it or that would order it for me. The attitude seemed to be that if it wasn't in their stock, they didn't want to sell it. I finally got a brochure from LJK and got a store to order from that. Neither LJK nor C.ITOH was any real help in the cable interface between the computer and the printer. I had to build my own cable by refering to schematics and guessing. I finally ended up with the following connections where "I" is the 850 interface module connector and "P" is the printer connector:

C1 to P1	C2 to P2	C3 to P3	C4 to P4
C5 to P5	C6 to P6	C7 to P7	C8 to P8
C11 to P14	C12 to P32	C13 to P11	C15 to P9

The printer is of the parallel interface variety. In order to actually get it to print I had to experiment with ten (10) little switches on the I/O (input/output) circuit card in the printer. I ended up with the following configuration for the switches: 1,2,4,5,7,10 are open; 3,6,8,9 are closed. What do you know, the setup was actually now working!

I am really pleased with Letter Perfect. It does all I expected and more. It will do headers, footers and automatic page numbering. It is very easy to change line spacing, line widths and paper length. It has great editing capability for a lousy typist like me, including text block moves. I especially like the data base merge capability for doing personalized form letters. My letter writing to my brothers and sisters has picked up in frequency and now the letters are even legible. Now if it would only work on my spelling

The real beauty of this system is its versatility. It is pre-programmed to work with other printers such as Atari, Epson, Qume/Diablo, and NEC. Then, of course, you can always make it work with other printers as well by making up a special print driver disk. That leaves it open for when I do get a Dot Matrix printer.

It uses LJK dos rather that ATARI dos but this hasn't caused any problems for me. You can convert ATARI dos files to LJK dos files quite easily with a utility disc furnished with the cartridge.

I found the documentation very good and easy to follow for Letter Perfect. Not so for the printer. I suspect that there are features of the printer that I'm still not taking advantage of. LJK has been very cooperative to work with. There were some problems with mixing of files on the disk. I sent the cartridge in and they not only fixed it but upgraded it to the very latest version which adds some more bells and whistles, all at no charge.

In any case, I can sure recommend the use of the LETTER PERFECT cartridge if you want to do letter quality work. Now if I could only get my wife to start using it --- I could build up my credit to get some more games.

If anyone has this printer and/or LETTER PERFECT or is contemplating purchase I would be happy to share my experience (new found expertise?).

A 48K/64K UPGRADE FOR YOUR ATARI 400!

by Claus Buchholz
Reprinted from the "MACE NEWSLETTER", September 1982

[Editor's note: ATARI, Inc. does not recommend that you try the following modification. After all, they don't even acknowledge that a '400 can be upgraded to 32K, much less 48K. Need we remind you that actually opening up the case and playing with the insides will void your warranty? This modification is not for the fainthearted or the clumsy-- one little "Oops!" and your '400 is DOA. We at MACE cannot even vouch that the mod works as we have not ourselves tried to duplicate the author's success.

Nonetheless, we know that among our members there are a few incorrigible hackers who think that hardwired spaghetti improves the machine's asthetic value. as well as some who can't resist a bargain. Although we don't want to encourage you, we would rather have you down in the basement ripping your computer apart than out on the streets where you might do some real harm. So in the interest of public safety, we publish the following article. We suggest that you have a hardware manual handy as well, to refer to the schematics and block diagrams. After all, you've got almost $250 invested in your computer!]

None of us needs to be reminded of the awsome power of the ATARI personal computers. What many fail to realize is that, except for the full-stroke keyboard and greater configurability of the '800, the ATARI 400 shares all of the power of her big sister. The high performance/price ratio of the '400 makes it a very attractive computer.

The 16K RAM supplied (8K in earlier models), however, is simply inadequate for many users' needs. ATARI designed the '400 to address 32K but they don't sell 32K boards. Other manufacturers sell 32K and 48K boards, but their added cost severely decreases the performance/price ratio that distinguishes the '400 from other computers.

I have designed and implemented a 48K upgrade for the '400 that you can add for about $70 and a few hours work. With 48K, you can run nearly every program written for the ATARI computers, including that program you've not finished writing because, "It won't fit!"

The modification is based on the idea of replacing the existing 16K-bit (or 8K) RAM chips with the newer 64K-bit devices. These dynamic RAMs are operationally compatable with the 16K chips. Note the two major differences: The 64K RAMs have an additional multiplexed address pin to access the larger memory. Also, they need only a single 5V power supply as opposed to the 5V, 12V and -5V supplies which the 16K RAMS use (see Figure 1 for a pinout comparison).

Some circuitry must also be added to allow the '400 to address 48K. Note that the new RAM chips can hold 64K of memory, but the ATARI only addresses 48K. If you can't bear to waste the extra 16K, see the suggestions later in the article.

The parts listed in the Parts List are available from many mail order houses who advertise in the back of most computer magazines. You will also need a fine-tipped soldering iron, an ohmeter, small pliers, screwdrivers, solder, fine wire, and a clean and static-free place to work. You should have a little experience in working with electronics. If you don't find a friend who does and could help you.

The first step is to open your '400. Disconnect all cables. Turn the '400 over and remove the four screws in the underside of the plastic case. While holding the case together, turn it over again. Open the cartridge door and remove any cartridge. leaving the door open. Lift the rear of the top-half of the case over the door. To remove the case top from the keyboard, press on the bottom of the keyboard on either side until it bends, and slide the keyboard away from you. The case top should now be free. Now remove the keyboard by pulling straight up on the flexible connector under the right side of the keyboard.

The circuit board on the right is the power supply. The computer is inside the metal case. Remove the two screws that fasten the left side of the power supply board to the right side of the metal case. Gently, but firmly pull up the left-front side of the power supply to disconnect it from the main board on the bottom. Be careful of the plastic interlock switch plunger when moving the power supply board. Now remove the speaker connector from the left-front of the main board, and lift the metal case out of the plastic bottom.

Turn the metal case over and remove all the screws in the bottom plate. Now pull the main circuit board up and out of the metal case, taking care not to flex the board. You may have to gently pry the edges to loosen the board from the metal case.

You will now see the '400 in it's full splendor. Lay the main circuit board down so the joystick ports face you. The smaller boards sticking up are memory board and CPU board. The one nearer you is the memory board. Unplug each, again being careful not to flex the circuit boards. You may also remove the beige plastic piece on the main board by bending it's prongs underneath the board.

Look at the CPU board. It has three large chips. The middle one is the CTIA or GTIA. If you want to replace your CTIA with a GTIA, now is the time to do it. The CPU board is not altered in this memory upgrade, so put it away.

Look at the memory board. The eight chips along the top are the RAM chips. The other four chips are the addressing circuitry. The edge pin connectors at the bottom are labeled as in Figure 2. If you have an 8K '400, you must alter the memory board before proceeding with the upgrade. Instructions for this modification appear at the end of the article.

The first step in the 48K modification is to eliminate the 12V and -5V sources on the board and move the 5V source to where the 12V used to be. As shown in Figure 3, cut the trace going from pin "X" of the board's edge connector to the capacitor C521. Also cut the trace going from edge pin "Y" to C523. Cut the traces cleanly and completely. Be careful not to slip and damage adjacent traces.

Now remove the capacitors C521 and C523. The trace coming from pin "W" carries 5V. Using a short piece of wire, make a solder bridge between this trace and the old 12V trace, at the point where C523 used to be (see Figure 3). Next, remove the eight capacitors C503, C505, C507, C509, C511, C513, C515 and C517, which are usually in a row along the top of the board.

We now have 5V going to pins 8 and 9 of the RAM chips, and no connection to pin 1. Remove the eight RAM chips and insert the 64K RAMS in their place, properly orienting the notched ends. With an ohmmeter, make sure there is no connection between edge pin "Y" and pin 8 of the chips, nor should there be any connection between any two of the edge pins "W", "X" and "Y".

If all has gone well, the board should be functioning exactly like a 16K memory board, since the addressing circuitry has not been altered. Now may be a good time to test the board (particularly the new RAM chips). If you wish, reassemble the entire computer and check to see if it works properly as a 16K '400. If it doesn't work, recheck all connections and disconnections made so far.

Now take the 5V supply off pin 9 of the RAM chips. To do this, cut the rightmost wide trace on the chip-side of the board (see Figure 4).

Pick up the 74LS158 chip, which is the same as the chips Z503 and Z504 on the memory board. With needlenose pliers, carefully bend up all pins except 1, 8, 15, and 16 (see Figure 5). The remaining four pins are to be soldered to the chip Z503. Remove the chip at Z503 from it's socket and place the 74LS158 on top so that the four pins listed above touch the same four pins on the lower chip (as in Figure 5). Carefully, solder each of the four pairs together, being careful not to get too much solder on the end of each pin.

Now solder a 4" length of wire to each of the pins 2,3 and 4 of the top

chip. Reinsert the chip pair at Z503. Solder the wire from pin 2 into the hole attached to edge pin "M", and the wire from pin 3 to edge pin "U". Next solder the wire from pin 4 to a hole in the former 5V bus, the wide trace along the top of the chip side of the board.

The memory board is now complete. With an ohmmeter, check all connections diagrammed in Figure 6.

The final stage involves modifiying the main (mother) board itself. To help you visualize this stage better, I have included a partial schematic in Figure 7, and a pin diagram in Figure 7a. Locate chip Z103 forward of the memory slot (see Figure 7a). On the underside of the board, cut the traces leading from pins 1 and 2 of Z103. Now attach a wire from pin 24 (across from pin "BB") on the underside of the CPU board slot to pin "U" under the memory slot. Attach a second wire from pin "CC" under the CPU slot to pin "M" under the memory slot.

Now wire the circuit of Figure 7, using the pin diagram of Figure 7a. On the 14-pin socket, solder pins 3 and 4 together with a short piece of bare wire. Do the same with pins 2 and 13. Next solder an 8" length of wire to each of the pins 1, 5, 6, 7, 11, 12 and 14. With these wires, make the six connections to the underside of the cartridge slot as diagrammed. The seventh wire from pin 1 goes to pin 18 on the underside of the memory slot.

Plug the 74LZ02 into the socket and bend the wires around some notches on the edge of the main board, between the crystal and cartridge slot. Finally, solder one of the 680 Ω resistors between pin "A" under the cartridge slot and the nearest ground connection. Be especially careful that excess solder does not form "bridges", making electrical connection where none should exist. Put the second 680 Ω resistor between ground and pin 14 under the cartridge slot.

The modification is finished. Recheck all connections, as an improper connection may damage the computer. Reassemble the computer, being careful that the 74LS02 chip doesn't touch any other circuitry. It's a good idea to wrap the chip in electrical tape.

Plug in the '400 and turn it on. If the blue screen doesn't come up quickly, turn it off immediately and check that your work, including reassembly, has been done correctly. If you have exercised proper care, you should now have 48K of RAM for your '400. Enjoy!

MODIFYING AN 8K BOARD

Near the center of the board are six pair of holes marked A through F in which two resistors reside. Remove both resistors. If one of them is at C, leave it there. Otherwise, solder one of the removed resistors at C. Now solder a wire

from edge connector pin "H" to the trace that connects holes D,E and F together.

Next, cut the trace leading to pin 13 of the chip at Z501, and solder a wire from this pin to edge connector pin "U". The board is now ready to be modified for 48K as described above.

SUGGESTIONS FOR A 64K MODIFICATION

Figure 8 shows a circuit that will allow you to access the unused 16K on your modified board. After you have successfully completed the 48K modification as described above, disconnect the wire you put between edge pin "U" and pin 3 of the 74LS158. Wire the circuit of Figure 8 in it's place.

Two more chips are needed for this circuit, a 74LS00 quad NAND gate, and a 74LS74 dual flip-flop. They may be wired to the memory board using sockets as you did with the 74LS02. The NOR gate on the left is from the 74LS02 chip you wired to the main board. You may bring it's output to the memory board through an unused edge pin such as pin "V".

The extra 16K is bank switched with the middle 16K of the 48K RAM. By writing a 1 to a memory location between D700 and D7FF (55040 to 55295 decimal), you replace the middle 16K of your 48K with a new bank of 16K. When you write a 0 to the same location, you get the original bank back. This is best done in machine language, since you can confuse BASIC by switching out part of a BASIC program.

Although you must be careful in using this extra 16K, it can come in very handy for storing extra graphics screens or other kinds of data. I have not yet implemented this 64K modification, so I leave it to the more adventuresome of you to build, test and use.

FINAL NOTES

When a cartridge is inserted into the '400, the addressing circuitry disconnects the top 8K of RAM. For example, with the BASIC cartridge you only have 40K of RAM. This is normally the case with the '800 also. If ATARI ever comes out with a 16K ROM cartridge, it will properly disable the top 16K of RAM when inserted.

Remember, that performing this modification will void any warranty remaining on your '400. If you just can't get the modification to work, you may repair all the cut traces, remove added circuitry, and insert the original RAM chips to restore your '400 to it's original condition, assuming nothing was damaged.

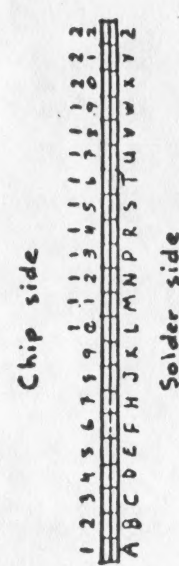FLASH!! Dave, KD8Z has done this modification and says it works great!!!!

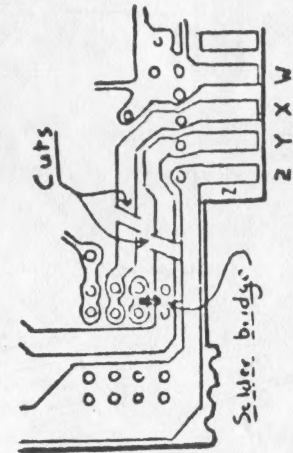Fig. 2 - Connector identification for memory board, seen from below

Fig. 3 - Lower left corner of solder side of memory board

PARTS LIST

QTY	ITEM
8	4164 200 nanosecond dynamic RAM
1	74LS158 quad 2 to 1 multiplexer
1	74LS02 quad NOR gate
2	680 ohm 1/2 watt resistor
1	14-pin DIP soldertail socket
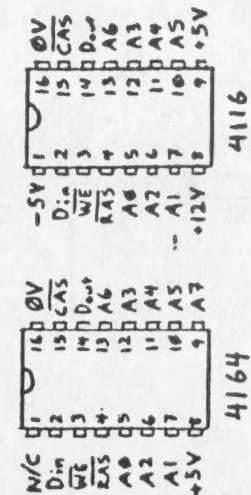
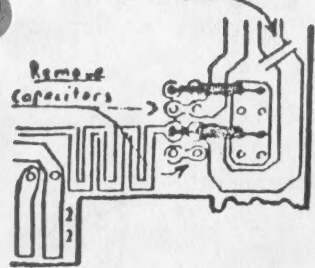Fig. 1 - Pinout comparison of 64k- and 16k-bit RAMs

Remote
capacitors →
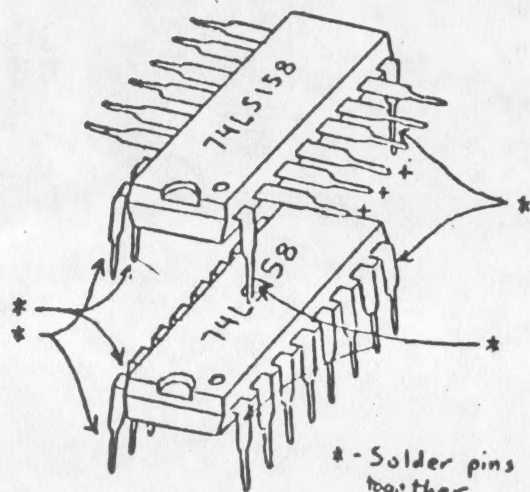
Fig. 4 - Lower right corner of
chip side of memory board

74LS158

74LS158

* - Solder pins
together

+ - Solder wire
leads onto
these pins

Fig. 5 - Piggyback arrangement

Z5Ø3

SEL	1
ØV	9
STR	15
5V	16

74LS158

1	SEL	1Y	4
9	ØV		
15	STR		
16	5V		
2	1A		
3	1B		

4164 RAMs

| 9 | A7 | 5V | 8 |
| | | N/C | 1 | N/C |

+5V

edge pins: M U
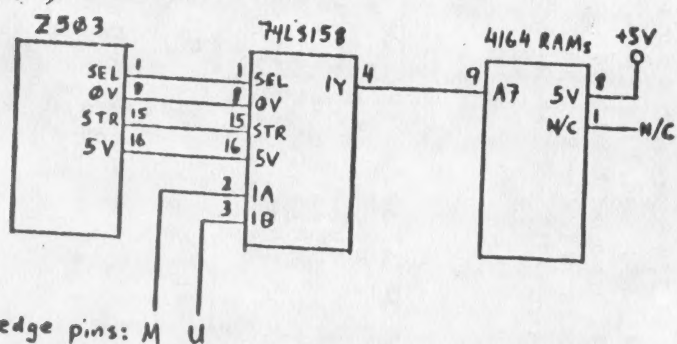
Fig. 6 - Schematic for memory board
modification

14-pin socket
for 74LSØ2

68Ø Ω →

Cart. Slot

Cuts

Mem Slot

CPU Slot

Underside of main board
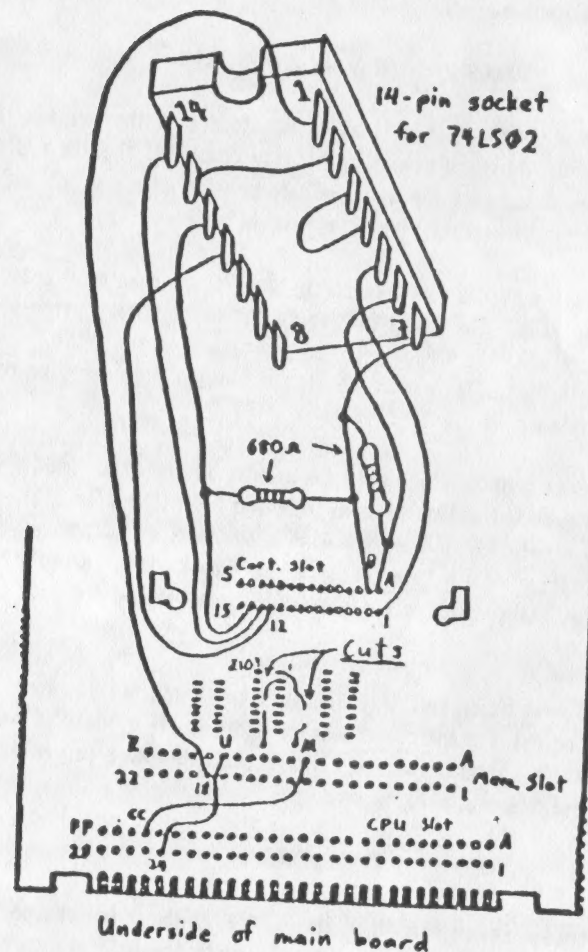
Fig. 7a - Connections for main board
modifications

FLASH!! ATARI has started sending
ALL 8ØØs with 48K from the
factory at the same price!
de Duane, WD8ØYF

Atari *LOGO* will be out this summer on a 16K cartridge for under $100. It will work with all three computers. Neato!

Want to be an Atari Computer Camp counselor this summer? One of the camps will be in San Diego (Mission Bay). If you're interested, information is in the Red Book in our library.

EDITORIALette   by James A. Jengo

Howse about a Devil's Advocate viewpoint on the new wonderful (wowee!) 1200XL computer? Well here are a few things to think about: with only one cartridge slot what will we do with our Monkey Wrench (a disk version would not be nearly as convenient to use); 64K of memory is great but remember the Operating System will reside in RAM thus using up quite a bit of it (ROM resident in 400/800 while running), perhaps leaving even less RAM for programing than in a 48K 400/800; want extra bank memory (Ramdisk, etc.)... with no accessable slots, how do you hook it into the buss?; also, 2 less joystick ports (what about 4-player Basketball or Asteroids or digitizing boards?). Oh, yes, don't forget that it will cost more than the 800, even with all these features. Any bets that the 800 will get phased out (to add insult to injury).

Please correct me if I am wrong, but what with all these other new computers with special new features coming out now, hasn't Atari just put the 800 in a *sleak*, new case and eliminated much of its versatility? I guess I sure don't understand progress!!!
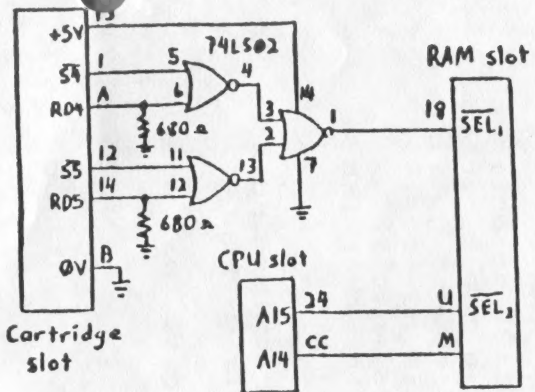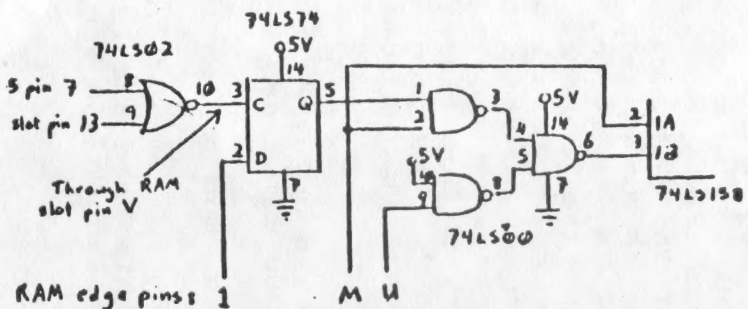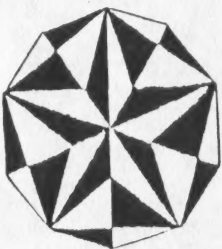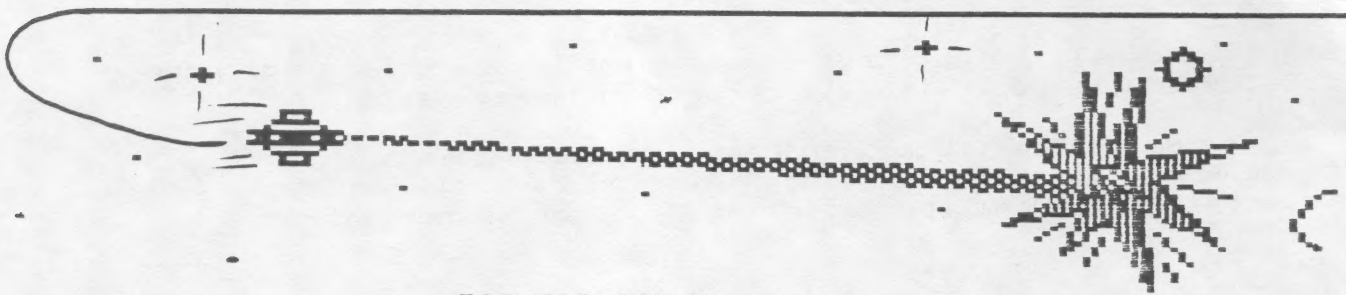

Fig. 7 - Schematic for main board modification

Fig. 8 - Schematic for 64K modification

CAGLE'S CORNER
Game Review

By William R. Cagle

ASTRO CHASE,"there is no escape!"

This progam was made for the Atari 400/800. It requires 32K of
RAM. It is written in machine language, so remember to remove any
cartridge you may have in the computer.

This is an arcade type action game that requires a joystick. It is,
in general, a space shootout for one person. You are the pilot of a
saucer, and you are trying to defend the Earth from a hostile alien
force. The aliens have planted 16 Mega-Mines in orbit around the
Earth. Each one of these mines is able to destroy the Earth, so you
must vaporize them before they can reach the planet. To complicate
matters they also are sending in many waves of space fighters. Each
wave have their own ways of attacking you. They can range from
RAMMING to shooting LASERS at you. Each wave there after gets
harder and faster. There are 32 chases in all. (Chases 1 through 24
are known, but 25 to 32 are not.)

The field of battle is the solar system but, there is a force field
around the entire system so you can't escape from the aliens. There
are four(4) energy generators at the four corners of the force field to
reenergize your power as it gets low. There are also eight(8) shield
depots so you can energize your shields,because when you do you
become invulnerable and can ram an alien ship without blowing
up.(Unfortunately this last only a few seconds) Once you have set
your saucer on its way by moving the joystick in any of eight(8)
directions you may also fire your laser in any of eight(8) directions
by holding down the fire button and moving your stick in the direction
you wish to shoot. This will not move your saucer off course until
you release the fire button, or run into something. This device is
called "SINGLE THRUST PROPULSION", The programmer says that it
would be impossible to win without it. I sometimes think that its a
real pain in the tail!!!!!

I found the game to be very good over all. The graphics and sound
were good indeed, but you sure do get tired of the "1812 Overture".

On the Cagle scale of games, one to ten(1-10), I give this one a
good eight(8).

For FIRST STAR SOFTWARE, this game should be very successful.
It is exciting and always a challange, and for $29.95(Discount not
counted) it's a bargain.